

rials not admitting of the "coarse walling" being executed with facility, it was determined to introduce an ashlar facing of limestone, procured from the north coast of Anglesea, and set in cement to a depth of 18 inches from the face. The main seawall, immediately to the westward of the headland, was now commenced, and, as the embankment behind it was dependent on the completion of the tunnel, and the wall was unavoidably built in many detached lengths, it was necessary to increase the width of the base, by reducing the batter of the back of the wall. This wall had advanced very briskly during the summer of 1846, and was within 9 feet of the levels of the rails, with all the lengths joined, excepting the two openings through which the materials were carried from the beach, when, on the 22nd October the coast was visited by a severe gale, with a 17 feet tide, which completely destroyed the central portion of the wall between the two openings, besides damaging the other portions, and sweeping away the beach in front of the centre of the wall. In consequence of this lowering of the beach, it was decided to substitute for the central portion of the wall an open viaduct, consisting of thirteen openings, each 36 feet in clear width, and spanned by ten cast-iron girders, two for each rail, resting on solid ashlar piers, 32 feet in length, 6 feet thick under the impost, and 6 feet 9 inches thick at the footings, with semicircular ends next the sea. The remaining portions of the wall were completed with the limestone ashlar facing, taken from the destroyed length of wall, set in cement, and in many cases backed with brickwork, also set in cement: they were also built more upright, and nearly straight on the face. In order to preserve the foundations of those parts of the wall which remain uninjured by the storm, it was resolved to form a breakwater and terrace in front, by driving a zigzag row of piles, in bays at right angles to each other, and to back these piles with planks, behind which an artificial beach was formed. The parapet of the first length of wall, immediately to the eastward of the headland, was built for a length of 130 yards, from 8 to 11 feet higher than the level of the rails, for carrying one end of a sloating roof, or "lean-to," formed of whole timbers set close together, as a protection against stones and debris falling from the face of the cliff. In spite of the great difficulties encountered during the progress of these walls, arising from the peculiar locality and from the violent action of the sea, the viaduct last constructed proved perfectly satisfactory: it was, however, shown that, in point of expense, it would probably have been as cheap to have pierced a longer tunnel, and had a less extent of seawall, as the contingent expenses incurred in contending with the waves were very great, and were of a nature scarcely to be foreseen and provided for by engineers.

#### ST. HELEN'S GLASS WORKS.

In the course of a paper on glass read by Mr. Deacon, at the Liverpool Architectural Society, the reader said that the building of the St. Helen's Crown, Sheet, and Plate-glass Works was commenced in April, 1826, and glass was first made there in February, 1827. The firm consisted of six partners, among whom the shares were proportionately divided. The works now belong entirely to Messrs. Pilkington. At the commencement there were about forty or forty-five hands; but they have now in different departments, exclusive of the colliery, between 800 and 900 men in their employment. The exact number is by no means easy to ascertain: there are daily changes, and many join as partners in certain work by the piece, only one name appearing in the wages-book for the whole gang. As nearly as could be ascertained, the actual number is between 870 and 980. They are distributed in various ways: about 560 are such as may be truly called glass-makers, and are sub-divided amongst crown, sheet, and plate-glass, ornamental glass and shades. The rest are employed in the warehouses as sorters, cutters, and packers, as makers of pots, bricks, and other articles of clay; and then

comes a long string of trades, carpenters, wheelwrights, sawyers, bricklayers, masons, smiths, mechanics, engine-drivers, carters, and plumbers, all being waited upon by a large number of labourers and assistants of various kinds. In addition, there is the staff, which, without reckoning the proprietors, who take an active part in the business, consists of two general managers, and one who resides on the works, and whose duties are more limited, fifteen clerks, thirteen managers of departments, and twenty-seven working foremen. Then there is a functionary of quite another class—the schoolmaster. Many boys are employed, and working at uncertain hours, often all night, no regular day or night school would receive them as scholars. A school was, therefore, established at the works for the use only of such as are actually employed. Under sixteen years of age the attendance is compulsory, at times arranged each day by the schoolmaster and the several managers and foremen. The number on the school-books, both above and below that age, is 117. The weekly product of the work is about 100 tons of glass, in working which 650 tons of coal are consumed.

#### BOOKS.

*The Principles of Colour applied to Decorative Art.* By G. B. Moore, Teacher of Drawing in University College, London: London: Taylor, Walton, & Co. 1851.

THE want of established principles for the application of colour, apparent during the late discussion on painting the building for the Great Exhibition, has led to the production of this volume (74 pages), which the author terms "an attempt to investigate the principles on which the works of the middle ages were accomplished." This is the view he takes of early decorations:—

"In the most successful decorated interiors of France, Belgium, and Italy, the application of colour appears to have been on the same principles that guided the great painters of the Venetian and Flemish Schools in their pictorial combinations. In their works, the primary colours, yellow, red, and blue, are seldom employed in large quantities: they are often concentrated, and almost invariably graduated, broken, or varied, by the mixture of the complementary colours: the secondary colours, orange, violet, and green, formed by the mixture of two of the primary colours, were applied in similar graduated quantities, and the greater proportions in their compositions were generally composed of the tertiary hues, formed by the mixture of three primary colours, with one predominating; or the quaternary hues, formed of the three primaries, with two or a secondary colour predominating. These hues are often mis-termed neutrals, a term that properly belongs to the various shades between white and black, in which the three primary colours are blended in proportions that balance or neutralise each individual colour."

He regards the various colours under the following classes and terms:—

Primary positive colours.	White.	Yellow.—There are no distinct general terms for the delicate tints, those in use being borrowed from objects containing them: lemon-yellow, straw-colour, and primrose.	
	Red.	The delicate tints, pink, carnation, rose.	
Secondary positive colours, composed of two primaries.	Orange.	Comprehending—Crimson, when the red is in great excess.	
	Purple.	Violet, lilac, where the red and blue are balanced.	
Tertiary hues, composed of the three primaries, with one primary predominating.	Green.	Blue-purple, where the blue is in excess.	
	Citrine.	Buff, in the lighter hues.	
	Brown.	Tawny, or tan, in the deeper.	
	Grey.	Maroon.	
		Chocolate.	

Quaternary hues, composed of the primaries, with two primaries or a secondary colour predominating.	Quaternary hues, composed of the primaries, with two primaries or a secondary colour predominating.	Quaternary hues, composed of the primaries, with two primaries or a secondary colour predominating.	Quaternary hues, composed of the primaries, with two primaries or a secondary colour predominating.
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He maintains that in Nature the use of the positive colours is confined to small parts; and this is his deduction:—

"It appears, that if the principles found in nature, and adopted in the works of the greatest colourists are correct, we should use the tertiary, quaternary, and neutral hues, for the greater quantities, and reserve the primary and secondary positive colours to heighten the effect, or attract attention to the points of interest. As far as I can recall to memory the effect of various edifices, the most successful appear to have been decorated on the above principles; but the decorations of buildings, like pictures, often improve, as well as suffer by the hand of time, and it is difficult to say how far the harmonious mellow effects of the older buildings may not have arisen from the crude positive colours being softened and subdued by age, though we can generally judge if portions have been decorated in brighter tints than the rest. In the Gothic churches in Belgium and France, the greater quantity of the walls were generally left uncoloured, the subdued broken hues of the stone and rich carved woodwork forming a relief to the more positive colour of the glass windows, pictures, and marbles; and where marbles were much used, as at St. Mark's, Venice, the greater proportions were generally of rich deep harmonious hues, and the brighter marbles reserved for the altars, shrines, &c. At St. Peter's and the other basilicas of Rome, the marbles form intermediate hues between the more positive colour of the pictures, mosaics, &c., and the subdued hues of the walls."

#### Miscellaneous.

**SOCIETY OF ANTIQUARIES.**—The report on the treasurer's accounts for the last year shows a balance in hand, after payment of the current expenses, of 1,250*l*. The capital stock 7,000*l*. A paper was recently read by Mr. J. H. Parker, on the mediæval architecture of the western part of France, including Angers, Saumur, Fontevault, &c. The representations were executed by an artist Mr. Parker took with him on a recent expedition. Mr. Rickman shows the intimate connection between our sacred edifices of the Anglo-Norman period and those of the north of France. Mr. Parker thinks the resemblance was not less striking as regards the cathedrals and churches in the whole of the western provinces of France.—The anniversary meeting on the 23rd will be regarded with more than usual interest, as it will celebrate the hundredth year of the charter. Amongst others, twelve members of the British Archaeological Association (not fellows of the society), and twelve members of the Archaeological Institute, will be invited to the dinner.—The Duke of Northumberland is moving these two bodies and the society into joint action.

**THE SAPPERS OF THE SURVEYORS.**—Your correspondent "J. T. S." in *THE BUILDER* of the 15th March, has alluded to the true cause of this mischief: it is indeed centralisation which has appalled the occupation of the land surveyors, and we have only to look to the New Metropolitan Buildings Bill for the last effort centralisation has made, in seeking to deprive the magistracy of the power of appointing the district surveyors, and vesting such power entirely in a Government Board. If the profession do not take care not only to repress this but similar attempts to interfere with their occupation, the care of the metropolitan buildings will soon pass from them, as the metropolitan survey has already done, into the hands of the military.—C. E.